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*On a mode of giving permanent flexibility to brittle specimens
in Botany and Zoology*

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THE excessive fragility in the dry state, of many plants, and particularly of those which secrete carbonate of lime is well known to botanists. There is no herbarium in existence in which the specimens of Amphiroa, Jania, Corallina, Halimeda, Liagora, Chara, &c. are not in a more or less mutilated condition, which becomes worse every time the plants are examined. In studying a large collection of the stony Algæ I was led to remark their perfect flexibility while moist, which passed to great brittleness when dry, and it occurred to me that if they could be kept permanently moist they would remain permanently flexible. I then remembered that General Totten, of the U. S. Engineers, had mentioned to me, some years ago, his success in preventing the cracking and peeling off of the epidermis of various shells, by impregnating them with chlorid of calcium. I also remembered Boucherie's experiments with the same substance in giving flexibility to wood. The principle that *a substance which is flexible when moist, will remain permanently moist, and therefore permanently flexible, when impregnated with a deliquescent salt,* is so obviously true that it needed no experiments to convince me of its applicability to the fragile plants above mentioned, and to many other specimens in natural history. But as practical difficulties often occur in the application of correct principles, I have tested the process by numerous experiments in which chlorid of calcium was employed to give flexibility to various vegetable and animal products, and the results have fully equalled my expectations. My specimens of Amphiroa, Jania, Corallina, &c. after being impregnated with this salt, and then exposed for months to the air, can be handled as freely as if just taken from the water, and they permanently retain almost the utmost degree of pliability they are capable of receiving. Species of dry, crisp and brittle Lichens when treated in the same way became soft,

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elastic, and flexible, so as to bear very rough handling with perfect impunity. Many of the common Algæ which shrink much in drying, and therefore assume a very unnatural appearance, and besides are apt either to become cracked or torn, or to wrinkle up the paper to which they adhere, retain after immersion in this salt, nearly their normal degree of distention, and preserve a much more natural appearance than when dried in the usual way. Many dried specimens of plants whose leaves, flowers or fruit, drop off almost at a touch from specimens in my herbarium, became permanently pliable when immersed for a short time in a solution of chlorid of calcium, and could then at any time be handled freely, while their appearance was in no degree injured.

In the animal kingdom, the results obtained in restoring permanent flexibility to dry and brittle specimens of Crustaceans, Insects, Gorgonias, Sponges, &c. were equally satisfactory, and have convinced me that almost every naturalist will, in his own department, find many useful applications for this process.

The *mode of application* which I have employed is to immerse the dry specimen for some time in a neutral saturated solution of chlorid of calcium, (which any one can make for himself by saturating chloro-hydric acid with marble,) and then after the specimen has become sufficiently softened to bend easily, remove it and let it drain in the open air. In some cases where the specimens do not imbibe the salt readily, it is well to soften them in warm water before immersion in the salt. A speedy impregnation will then take place, after which the specimens, if plants, may be subjected to moderate pressure in the usual way, and restored to the herbarium, while other specimens may be kept on shelves or in any way usually employed for similar objects, and all will for any length of time retain sufficient moisture to prevent brittleness. The salt being neutral, no fear need be apprehended of its injuring color or texture, while its antiseptic properties will aid in the preservation of matters liable to decay.